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Specimen (1) was of a light grayish color, specimen (2) was dark brown.

Associated with the cassiterite is tourmaline, menaccanite, mica, zircon and rutile, the two latter scarce. Much of the cassiterite is in small grains with tourmaline.

NICKEL FROM NEVADA.—Important deposits of nickel ore have been discovered in Churchill county, Nevada. Some thirteen veins, varying in width from ten to thirty-five inches, traverse a ledge of rock, the gangue separating the veins consisting of silica, iron, lime and magnesia. As recently determined by S. B. Newberry[1], the ore at the greatest depth (eighty feet) consists of nearly pure niccolite. Nearer the surface oxidation products appear. At the ten feet level the ore is mainly the hydrated arseniate, or annabergite. There is every prospect that the nickel mines of Nevada will eventually become a prominent source of supply of this valuable metal.

VANADINITE.—Vanadinite in brilliant red and yellow hexagonal crystals is reported by F. H. Blake[2] as occurring in Pinal county, Arizona. Wulfenite occurs at the same locality. The vanadinite occurs in the seams of a partly decomposed rock resembling trap, covering sometimes five square inches of surface. The crystals are small and are generally simple hexagonal prisms whose prismatic planes are striated vertically, the opposite of what occurs in pyromorphite. Some few modifications also occur.

BOTANY.[3]

STRUCTURE, DEVELOPMENT AND DISTRIBUTION OF STOMATA IN EQUISETUM ARVENSE.[4]—The stomata develop less rapidly on the stem than on the leaves, and hence in order to study them in their earlier stages, it is best to cut a section of epidermis from a very young stem.

In the earliest stages I could find, the mother-cell of the stoma occurred as a cell of equal rank with the others, but was divided into four guard cells lying side by side, their longitudinal axes being parallel to that of the stem (Fig. 1 *a*). As the ordinary epidermal cells develop they grow more in length than in breadth, while the stomata grow equally in both directions, and crowd upon the surrounding cells (Figs. 1 and 3). In the meantime the outer pair of guard cells arch over the inner pair (Fig. 1 *b*) and finally completely cover them (Fig. 3). When mature, the guard cells are loaded with silica arranged in radiating bars (Fig. 3), and usually the inner pair is entirely hidden; but if a thin cross-section of a mature leaf be obtained, the two pairs of cells can be seen, one above the other (Fig. 2, *a a*, upper pair of guard cells; *b b*, lower pair).

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[1] *Amer. Journ. Sc.*, 1884.

[2] *Ibid.*

[3] Edited by PROF. C. E. BESSEY, Ames, Iowa.

[4] Selected for publication from original work of students in the botanical laboratory of the University of Michigan, 1883-'84.

With reference to the distribution of the stomata, Sachs makes the general statement that in the genus Equisetum they are always found in the furrows and never on the ridges; but *E. arvense* seems to be a partial exception to this rule, as upon the leaves the stomata are invariably on the ridges.

Taking the fertile plant, we find the leaves arranged in sheaths at the nodes of the stem; these sheaths are entire at the base but broken at the top into numerous teeth, which begin to diverge in the deeper furrows (Fig. 4 *e e*). Fig. 4 shows an outline section of a leaf taken about half way up; the upper surface is the outer one, on which the stomata are always located. It will be seen that between the furrows, *e e*, there is a smaller furrow, *m*, along the central line of the leaf. On the ridges, *b b*, the stomata occur, disappearing about two-thirds of the way from the base of the leaf where they are most abundant. Where the leaves join the stem the furrows, *e e*, are continued (Fig. 5 *e e*), the furrow *m* disappears, becoming continuous with the highest part of the ridge of the stem (Fig. 5 *m*). Fig. 5 is a section of one of the ridges of a stem; *a a* are the cells containing chlorophyll; where these touch the epidermis there is a slight elevation above the general slope, and on these places the stomata occur.

The distribution of stomata on the stem and stem leaves is alike on the fertile and sterile plants, but the branches have another method of arrangement. On the leaf of the branch (Fig. 6) there is no central furrow, but its place is taken by a sharp ridge (Fig. 6 *m*), and the ridges and furrows of the leaf are all continued on the branch. On the leaves the stomata are borne on either side of the ridge (*b b*), but on the stem they pass down into the furrows and lie on either side of the lowest part.

This arrangement of stomata in *E. arvense* is peculiar to the species, for in *E. limosum* and *E. hyemale* they lie, on the stem, exclusively in the furrows.

EXPLANATION OF PLATE XXXII.

FIG. 1.—Epidermis of stem (preserved in alcohol).

FIG. 2.—Cross-section of a stoma.

FIG. 3.—A mature stoma.

FIG. 4.—Cross-section of leaf of fertile plant.

FIG. 5.—Cross-section of ridge of stem.

FIG. 6.—Cross-section of leaf of branch.

—Effie A. Southworth, Ann Arbor, Mich.

THE DESMIDS OF THE UNITED STATES.—A new impetus will be given to the study of these beautiful plants by the publication of Rev. Francis Wolle's book, Desmids of the United States, lately received. Over four hundred and fifty species and well

Fig. 1.

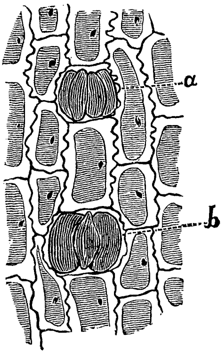


Fig. 4.

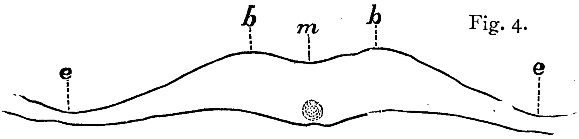


Fig. 2.

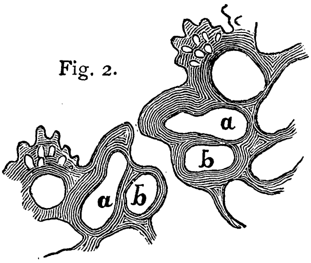


Fig. 5.

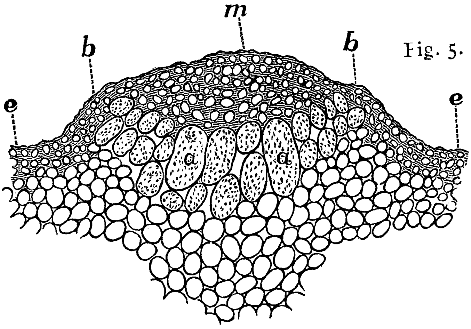


Fig. 3.

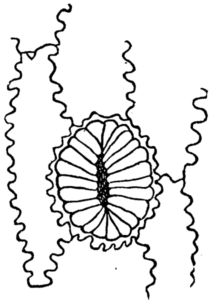
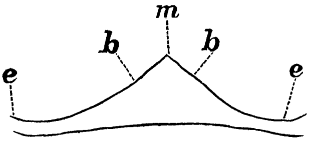


Fig. 6.



Stomata in *Equisetum arvense.*

marked varieties are described and figured with a fullness as to detail and coloring which leaves little to be desired. The fifty-three colored plates contain eleven hundred figures, most of which are magnified 500 times, relatively few being magnified 375 and 250 times. The making of these plates alone involved an amount of labor for which botanists will certainly be very grateful to the industrious author. That the work has been largely a labor of love is evident from the fact that it is sold for five dollars.

The following directions for collecting desmids (page XIII) will show the author's style, and may serve to incite some of the NATURALIST'S young collectors to search for these beautiful and interesting plants :

"The outfit need not consist of more than a nest of four or five tin cans (tomato or fruit), one within the other for convenience of carriage; ten or a dozen wide-mouthed vials, and a small ring-net made of fine muslin at the end of a rod about four feet in length. Should a boat be needed it can usually be hired on the spot. After selecting what seems to be a good locality, drag the net a few feet among the grasses and mosses, allow the bulk of the water to drain through the muslin, and then empty the residue into one of the cans; repeat this process as often as may be desirable. Ten or fifteen minutes after the cans have been filled, most of the surface water may be poured off and the remainder transferred to a glass vial, where the solid contents will gradually sink and the superfluous water can be again poured off and the vessel filled up with deposits from other vials. In shallow places what is known as swamp-moss (Sphagnum), bladderwort (Utricularia), water-milfoil (Myriophyllum) or other finely cut-leaf water plants are likely to abound; these should be lifted in the hand and the water drained or squeezed from them into a tin can to be subsequently treated as already stated. A few drops of carbolic acid in each vial, just enough to make its presence perceptible, will preserve the contents for months, and even years from deterioration; the green coloring matter (*chlorophyll*) may fade, but this, in the case of desmids, is of little importance; nevertheless, when practicable, always examine the materials when fresh. When dried on paper for the herbarium the specimens can still, after being moistened with water, be microscopically examined, but not with the best results, since the drying up is apt to collapse or otherwise distort the cells.

"The collector will not know the value of his find until it has been brought drop by drop under the lens of his microscope, and out of the entire mass he may discover nothing to reward his labors; this, however, should not discourage him, as one or two failures are to be expected prior to meeting with an adequate reward. His interest in the study will be greatly enhanced if he keeps a record of it in sketches of what the microscope reveals to him. These sketches should, of course, be very exact, and in order that they may be so, it is necessary that the microscope should be provided with an eye-piece micrometer with which to measure the length and breadth of the figure to be sketched. * * It is so difficult to separate specimens from their accompanying foreign matter that it is seldom amateurs can mount them satisfactorily on slides, and therefore this method of preserving specimens is not open to recommendation."

BOTANICAL NOTES.—Dr. Gray's Revision of the North American species of the genus Oxytropis, communicated to the American Academy of Arts and Sciences, May 14, 1884, and but lately received, is an attempt to clear up some of the obscurities of the subject. Sixteen species are recognized as occurring in North America, but one of which occurs on the Atlantic coast, viz., *O. campestris* L., in Northern Maine, Lower Canada and Labrador. A second species, *O. lamberti* Pursh, occurs from the Saskatchewan river, Minnesota, and Western Texas, westward to New Mexico and Montana. Two varieties of this species are noted, viz., var. *sericea (O. sericea* Nutt.) from Wyoming to Texas and Arizona, and var. *bigelovii (O. lamberti* Torr., in Pacific R. R. Rept., IV, 80) on the Upper Canadian river. All the other species are from the Rocky Mountain region and Alaska.——With the foregoing we have also Notes on some American species of Saxifraga, by the same author.——Joseph F. James' Contributions to the Flora of Cincinnati, in the *Jour. Cin. Soc. Nat. Hist.*, contains many interesting notes on certain plants of the Cincinnati flora.——In an interesting paper, "Untersuchungen über die Bildung von centrifugalen Wandverdickungen an Pflanzenhaaren und Epidermen," just received, the author, Heinrich Schenck, discusses the thickening of the cell-walls of hairs and epidermal cells. A large plate with numerous figures illustrates the paper.——*Drugs and Medicines of North America* is the name of a promising new quarterly illustrated journal devoted to the discussion of the botany, pharmacy, chemistry and therapeutics of the medicinal plants of North America. It appears to be worthy of support. It is published by Lloyd Bros., 180 Elm street, Cincinnati, Ohio, for $1 per year.

ENTOMOLOGY.

LIFE HISTORY OF LOCHMÆUS TESSELLA.—The caterpillar of this moth is one of the most interesting among the Notodontians since it connects Cerura with the other genera, by reason of its two long caudal filaments, so much like those of Cerura. These appendages are simply modified anal legs, and seem to be tactile organs. This caterpillar is also interesting from its power when touched of forcing out a dense cloud of fine spray from a point near the head; exactly where this repugnatorial apparatus is sit-